A

Synopsis of thesis entitled

"Study of Solid waste Management and its impact on water quality from Nanded Waghala Municipal Corporation"

To be submitted to

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड.

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INTRODUCTION:

Solid waste management is one of the major problems faced by different cities all over the world. The problem is particularly due to urbanization, industrialization, poor urban planning and lack of adequate resources which contribute to the enormous amount of solid waste generation. This problem has resulted in serious environmental, social and economic complications in the developing countries like India. Population growth and dynamic economic activities in and around the city has resulted in a serious waste management crisis. Domestic, industrial and other wastes, whether they are of low or medium level wastes, they are causing environmental pollution and have become perennial problems for mankind (Ramasamy and Varghese, 2003).

The rise of mega-cities in the 1990s has also contributed to the growing problems of waste. The per capita waste generation in urban areas also varies according to the size of population. In urban areas with a population of less than 0.1 million people, the per capita waste generated is 0.21 kg per day, while in areas with a population of more than 5 million people; it goes up to 0.5 kg per day (Askariaun et al., 2004; Baveja et al., 2000).

The urban population was 217 million in 1991 and the total quantity of solid waste generated in urban areas was estimated at 20.71 million tons per year. This is expected to cross 56 million tones 2011 (Manohar et al., 1998; Da silva et al., 2004). The quantity and nature of the waste generated vary with the activities and with the level of technological development in a country. The problem of managing solid waste is caused by poor waste collection, storage and disposal leading to subsequent pollution and environmental degradation (Ramachandra and Shruti, 2007).

The generation being the non-point/area source, collection and disposal poses a serious problem to the local municipalities and other regulatory bodies. The National and State Governments have provided an impetus to improve the solid waste management in urban areas under various programs and schemes. The Jawaharlal Nehru National Urban Renewal Mission funded 49 SWM projects in various cities during 2006 to 2009 (Ministry of Urban Development, 2014).

Solid waste management is a discipline associated with the control of generation, storage, collection, transfer, and transport, processing and disposal of solid waste in a manner that is in accordance with the best principal of public health, economic, conservation and other environmental consideration responsive to public attitude (Bhatia, 2001).

MSW involves waste generation from various sources. MSW generation rates in small towns are lower than those of metro cities, and the per capita generation rate of MSW in India ranges from 0.2 to 0.5 kg/day. The type of waste generated from different sources varies from countries to countries (Siddiqui et al., 2006).

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Rapid population growth and urbanization results in increasing environmental concerns and municipal solid waste (MSW) management is of prime importance in such rising urban issues Solid waste generation is dynamic process which depends upon the population activities of urban areas. Therefore, there is urgent need to take step for the management of the waste because it reduces its impact on environment and human health. It is for this purpose that Faridabad city is selected to map existing solid waste management system and find out the impact of solid waste on its surrounding environment (Alten et al., 2003, WHO, 2014).

According to a Central Pollution Control Board (CPCB) survey, the quantity of solid waste generated by 23 large cities in the country is of the order of 30,058 tons per day (TPD). Mumbai generates the maximum with 5, 335 tons per day and Vishakhapatnam with the least at 300 tons per day. The problem of solid wastes, however, is not just limited to large cities. It has also seeped into small towns. The once beautiful towns of Shimla, Jaipur and Bangalore have become open bins and overloaded

dump yards in plenty. Review of the existing literature describes the nature and generation of wastes, its composition, physical and chemical characteristics, waste management techniques and their impact on environment are basic needs for the planning of a solid waste management system.

Solid Waste Generation:-

Municipal solid waste can be classified into garbage, rubbish/trash, ashes and bulky wastes. Garbage comprises waste from preparing, cooking and serving food, and market wastes from the handling, storage and sale of food. Rubbish and trash includes paper, cartons, boxes, barrels, wood, tree branches, yard trimmings, metals, tin cans, glass, crockery and minerals. Ashes include residues from fuel and the combustion of solid wastes, while bulky wastes includes wood furniture, bedding, packing material, metal furniture and rubber tires (Guerquin f, 1995).

Solid waste management has become a major environmental issue in India. The per capita of MSW generated daily, in India ranges from about 100 g in small towns to 500 g in large towns. For example, the population of Mumbai grew from around 8.2 million in 1981 to 12.3 million in 1991, registering a growth of around 49 percent. On the other hand, MSW generated in the city increased from 3200 tons per day to 5355 tons per day in the same period registering a growth of around 67 percent (CPCB, 2000).

Solid waste generation is a continually growing problem at global, regional and local levels. Solid wastes are those organic and inorganic waste materials produced by various activities of the society, which have lost their value to the first user. Improper disposal of solid wastes pollutes all the vital components of the living environment (i.e., air, land and water) at local and global levels. Urban society rejects and generates solid material regularly due to rapid increase in production and consumption.

The problem is more acute in developing nations than in developed nations, as their economic growth as well as urbanization is more rapid. This necessitates management of solid waste at generation, storage, collection, transfer and transport, processing, and disposal stages in an environmentally sound manner in accordance with

the best principles of public health, economics, engineering, conservation, aesthetics and environmental considerations. Thus, solid waste management includes all administrative, financial, legal, planning, and engineering functions (Ramachandra, 2006).

Composition of Solid Waste:-

The U.S. Environmental Protection Agency (EPA) uses two methods to characterize the 254.1 million tons of MSW generated in 2007. The first is by material (paper and paperboard, yard trimmings, food scraps, plastics, metals, glass, wood, rubber, leather and textiles, and other); the second is by several major product categories. The product based categories are containers and packaging; non-durable goods (e.g., newspapers); durable goods (e.g., appliances); food scraps; and other materials.

The composition and the quantity of MSW generated form the basis on which the management system needs to be planned, designed and operated. In India, MSW differs greatly with regard to the composition and hazardous nature, when compared to MSW in the western countries (Gupta et al., 1998).

Proper characterization of solid waste is fundamental activity for the planning of municipal solid waste management services. A detailed characterization or analysis is 45 essential for integrated solid waste management strategies to be successful, the amount and kind of solid waste that is produced and the behavior of the generator must be considered (Sakai, 1996).

Disposal Methods of Solid Waste:-

It is often desirable to use an integrated approach to solid waste management that includes components of recycling, composting, incineration and land filling. All of these are often proposed as the solution. Both composting and incineration leave substantial amounts of waste that must be land filled. By far the most common method of disposal is land filling, as it is apparently the cheapest and easiest (Lema et al., 1988).

Solid Waste Impact on Health:-

The unsanitary methods adopted for disposal of solid wastes is, therefore, a serious health concern. The poorly maintained landfill sites are prone to groundwater contamination because of leachate production. Open dumping of garbage facilitates the breeding for disease vectors such as flies, mosquitoes, cockroaches, rats, and other pests (CPCB, 2000).

Study Area:

Nanded district is surrounding its boundary with the other states of the India like that of Karnataka and Andhra Pradesh. In Marathwada region Nanded is second largest city after Aurangabad of Maharashtra; it is the head quarter division in Marathwada region of the state. It is the famous for Holy place Hazur Sahib Gurudwara for Sikh faith. Nanded is famous and district head quarter of Sanskrit poets. It is also famous for from the great ages for its Muslim Sufi Shrines. Nanded has great temples like Renukaderi at Mahur for Hindu faith also. Languages which are mainly spoken and official are Marathi, Panjabi, Urdu, and Hindi.

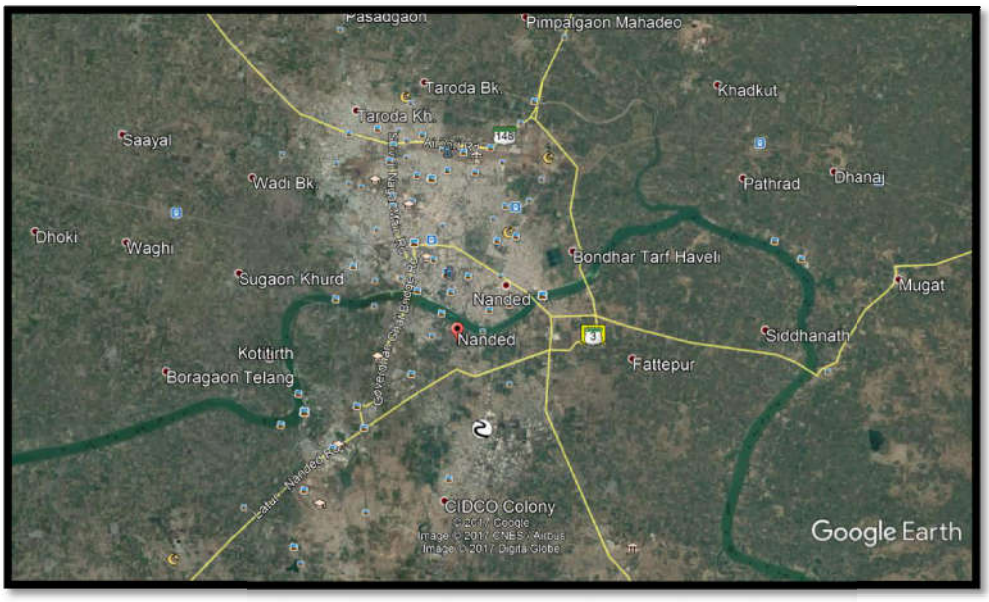

Figure: Google image showing location of study area

OBJECTIVES:

- To find out the solid waste load
- Methods employed for solid waste management
- To analyze leachate from solid waste dumping sites
- To suggest suitable interventional remedies to improve the solid waste management
- To generate awareness among the local people about solid waste

METHODOLOGY AND PROPOSED OUTCOMES:

Present study is conducted to know the actual process carried out by the municipal corporation and methods used by them for solid waste management that is segregation, collection, storage, transportation, treatment and disposal. Also ground water around the dumping site will be analyzed for physico-chemical parameters. To analysis, the respective samples will be collected from each location and will be brought for analysis. The water sample's analyses will be carried out with accuracy and following are the standard methods for water examination.

1. **pH** (Digital pH Meter):

   The pH of the aqueous solution for practical work is taken negative logarithm of hydrogen ion activity. The values of the pH are from 1 to 14, but from 0 to 7 are diminishingly acidic, 7 to 14 alkaline increasingly and 7 is the neutral.

   The pH has a great importance in the water chemistry. In natural water various compounds are dissolved in it, thus it is a measure of the acid base equilibrium achieved. The measurable amount of acidic or basic character at a given temperature is pointed out by pH or hydrogen ion activity. There are three methods for the determination of pH, these are Electrometric method, colorimetric method and pH test paper but Electrometric method is most accurate method.

2. **Total Dissolved Solids:**

Total dissolved solids are determined as the reduced left after evaporation of the filtered sample and measured in mg/L.

3. **DO:** (Winkler's method):

Dissolved oxygen is one of the most important parameter s in water quality assessment and reflects the physical and biological process prevailing in the water. Its presence is essential to maintain the higher forms of biological life in the water; and the effect of a waste discharge in a water body is largely determined by the oxygen balance of the system. It is estimated by Winkler's method in mg/L.

4. **Total Hardness** (EDTA Method):

Originally the hardness of water was understood to be a measure of the capacity of water precipitating soap. Soap is precipitate chiefly by calcium and magnesium ions commonly present in water but may also be precipitate by ions of other polyvalent metals such as aluminum, iron, strontium, manganese and zinc and by hydrogen ions. Because, all first two are usually present in insignificant concentration in natural water, hardness is defined as characteristics of water, which represents the total concentration of just the calcium and magnesium ion expressed as calcium carbonate.

However, if present in significant amounts other hardness producing metallic ions should be included. When the hardness is numerically greater than the sum of the carbonate alkalinity and the bicarbonate alkalinity, the amount of hardness, which is equivalent to the total alkalinity, is called carbonate hardness; the amount of hardness in excess of this is called non-carbonate hardness.

When the hardness is numerically equal to or less than the sum of carbonate and bicarbonate alkalinity all of the hardness is carbonate hardness and there is no non carbonate hardness. The hardness may range from zero to hundreds of milligrams per liter in terms of calcium carbonate, depending on

the source and treatment to which the water has been subjected. It is calculated in terms of mg/L.

5. **Calcium** (Titrometric Method):

Calcium is a chemical element with symbol Ca and atomic number 20. Calcium is a soft gray alkaline earth metal, fifth-most-abundant element by mass in the Earth's crust. The ion Ca^{2+} is also the fifth-most-abundant dissolved ion in seawater by both molarity and mass, after sodium, chloride, magnesium, and sulfate. Free calcium metal is too reactive to occur in nature. Calcium is produced in supernova nucleo synthesis. Calcium is essential for living organisms, in particular in cell physiology, where movement of the calcium ion into and out of the cytoplasm functions as a signal for many cellular processes. As a major material used in mineralization of bone, teeth and shells, calcium is the most abundant metal by mass in many animals.

6. **Magnesium** (Titrometric Method):

Magnesium also occurs in all kinds of natural water, but its concentration remains generally lower than the calcium. Like calcium, it is also one of the important cat ion imparting hardness to the water. It is measured in mg/L.

7. **Sodium** (Flame photometer):

The major cation of the extracellular fluid is sodium. The typical daily diet contains 130-280 m mol (8-15 g) sodium chloride. The body requirement is for 1-2 m mol per day, so the excess is excreted by the kidneys in the urine.

Hyponatraemia (lowered plasma [Na+]) and hypernatraemia (raised plasma [Na+]) are associated with a variety of diseases and illnesses and the accurate measurement of [Na+] in body fluids is an important diagnostic aid.

8. **Potassium** (Flame photometer):

Potassium (K) is the major cation found intracellular. The average cell has 140 mM K+ Inside but only about 10 mM Na+. K+ slowly diffuses out of cells so a membrane pump (the Na+/K+-ATPase) continually transports K+ into cells against a concentration gradient. The human body requires about 50-150 mol/day.

Hypocalcaemia (lowered plasma [K+]), hyperkalaemia (increased plasma [K+]) and hyperkaluria (increased urinary excretion of K+) are again indicative of a variety of conditions and the clinical measurement of [K+] is also of great importance.

9. Biochemical Oxygen Demand: (Incubation followed by Titration):

It is the oxygen required by the living organism present in the water for the decomposition of organic matter under the sufficient amount of oxygen. The amount of oxygen required for the stabilization is the amount taken as measure of decomposable organic matter.

Usually, the time is taken as 5 days and the temperature 20°C as per the global standard. The B.O.D. test is among the most important method in sanitary analysis to determine the polluting power, or strength of sewage, industrial wastes or polluted water. It serves as a measure of the amount of clean diluting water required for the successful disposal of sewage by dilution. The test has its widest application in measuring waste loading to treatment plants and in evaluating the efficiency of such treatment systems. Outcome is expressed in mg/L.

10. Chemical Oxygen Demand: (COD digester)

COD is the measure of oxygen consumed during the oxidation of the oxidizable organic matter by strong oxidizing agent. Potassium in the presence of

sulphuric acid is generally used as an oxidizing agent in determination of COD. Its results are expressed in terms of mg of oxygen.

WORK PLAN:

FIELD OF STUDY	STUDY, SURVEY AND MANAGEMENT OF SOLID WASTE QUALITY PARAMETERS, LEACHATE.
START OF Ph.D. STUDIES	AFTER COMPLETION OF REGISTRATION
STANDRED TERM OF STUDIES	THREE YEARS
FORM OF STUDIES	FULL TIME

Structure of Research Work:

TIME (MONTH)	**WORK**
00-06	REVIEW OF LITRATURE AND PROCEDURE PREPRATION
06-30	ANALYSIS OF WATER SAMPLE AND OTHER
30-36	DATA COLLECTION/STATISTICAL INTERPRETATION, WRITING OF THESIS AND SUBMISSION

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